

AMENDMENTS TO THE CLAIMS

1. (Currently amended) An information processing system, comprising:
a first computing device comprising:
 ~~a first physical port; and~~
 ~~a second physical port;~~
wherein ~~the first computing device is configured to autonomously, without invoking services of a host operating system:~~
 ~~receive, from a first network coupled to the first port, an initialization packet originating from a client;~~
 store information representing a connection with the client in a temporary table;
 output a response packet to the client;
 ~~receive, from the first network coupled to the first port, a request packet originating from the client; and based on at least a state of the first computing device and a second computing device, selectively:~~
 output a migration packet containing the information representing the connection with the client to the second computing device;
 remove the information representing the connection with the client from the temporary table in response to an acknowledgement indicating that the second computing device received the migration packet;
 store information representing the connection with the client in a forward table; and

~~output the request packet to the second computing device, wherein request packets selectively output by the first computing device are output through a second network logically separate from the first network and coupled to the second port.~~

2. (Previously presented) The system of Claim 1 wherein the first computing device is a network interface card.

3. (Previously presented) The system of Claim 1 wherein the second computing device is configured to perform an operation of a software application in response to receipt of a request packet.

4. (Previously presented) The system of Claim 3 wherein the software application is a socket-based application.

5. (Previously presented) The system of Claim 1 wherein the initialization packet is addressed by the client to the first computing device, and wherein the first computing device is configured to receive the initialization packet in response to the addressing.

6. (Currently amended) The system of Claim 3 wherein the operation includes outputting a response packet to the client, and wherein the first computing device is configured to:

~~in response to at least the request packet and the state, selectively output the request packet to the second computing device for outputting the response packet to the client, such that the output response packet bypasses the first computing device.~~

7. (Currently amended) The system of Claim 1 wherein the ~~[[first]]~~ initialization packet is received through a network ~~comprises~~ comprising a global computer network.

8. (Currently amended) The system of Claim 7 wherein the ~~second~~ migration packet is output through a network ~~comprises~~ comprising a local area network.

9. (Canceled)

10. (Currently amended) The system of Claim 1 wherein the ~~first computing device is configured to autonomously, without invoking services of a host operating system:~~

~~in response to at least the initialization packet, establish a data structure associated with a connection with the client, the data structure including~~ information representing the connection with the client includes a group of sequence numbers associated with the connection.

11. (Currently amended) The system of Claim 10 wherein the first computing device is configured to autonomously, ~~without invoking services of a host operating system:~~

~~in response to at least the request packet and the state, selectively output a reference to the data structure~~ selectively output a migration packet containing the information representing the connection with the client to the second computing device for performing an operation in response to receiving the reference to the data structure migration packet and the request packet, the operation including outputting a response packet to the client according to the group of sequence numbers, such that the output response packet bypasses the first computing device and appears to the client as received from the first computing device.

12. (Original) The system of Claim 10 wherein the group of sequence numbers includes at least one start sequence number, at least one current sequence number, and at least one acknowledgement sequence number.

13. (Currently amended) The system of Claim 1 wherein ~~the first computing device is configured to autonomously, without invoking services of a host operating system:~~

~~in response to at least the initialization packet, establish a data structure associated with a connection to the client, the data structure including the information representing a connection with the client includes an address of the first computing device; and~~

~~in response to at least the request packet and the state, selectively output a reference to the data structure wherein the request packet is output to the second computing device for performing an operation in response to receiving the reference to the data structure the migration packet and the request packet, the operation including outputting a response packet to the client with a source address that indicates the address of the first computing device, such that the output response packet bypasses the first computing device and appears to the client as received from the first computing device.~~

14. (Original) The system of Claim 13 wherein the address includes an IP address.

15. (Original) The system of Claim 14 wherein the address includes a port.

16. (Original) The system of Claim 15 wherein the port is a TCP port.

17. (Original) The system of Claim 15 wherein the port is a UDP port.

18. (Currently amended) A method performed by a first computing device of an information processing system, ~~the first computing device coupled to a first network via a first physical port and coupled to a second network via a physical second port, the first and second networks being logically separate, the method~~ comprising:

receiving, ~~through the first port,~~ an initialization packet originating from a client;

storing a data structure containing information associated with a connection with the client;

outputting a response packet to the client;

receiving, ~~through the first port,~~ a request packet originating from the client; and

based on at least a state of the first computing device and a second computing device, selectively;

outputting a packet containing the information associated with the connection with the client to the second computing device;

receiving an acknowledgement packet indicating that the second computing device received the packet containing the information associated with the connection with the client; and

outputting the request packet to the second computing device for performing an operation in response to the request packet, ~~wherein request packets selectively output by the first computing device are output through the second port,~~

~~wherein the method is performed by the first computing device autonomously and without invoking services of a host operating system.~~

19. (Previously presented) The method of Claim 18 wherein the first computing device is a network interface card.

20. (Original) The method of Claim 18 wherein the operation is part of a software application.

21. (Previously presented) The method of Claim 20 wherein the software application is a socket-based application.

22. (Currently amended) The method of Claim 18 wherein the initialization packet is addressed by the client to the first computing device, and wherein the receiving, ~~through the first port,~~ an initialization packet originating from a client comprises:

receiving the initialization packet in response to the addressing.

23. (Currently amended) The method of Claim 18, ~~the selectively outputting, through the second port, the request packet to the second computing device for performing the operation in response to the request packet comprising:~~

~~selectively outputting, through the second port, the request packet to the second computing device, for~~ wherein the operation in response to the request packet comprises outputting a response packet to the client that bypasses the first computing device.

24. (Currently amended) The method of Claim 18, ~~the first network comprising a global computer network, and further comprising:~~

receiving the initialization packet through ~~[[the]]~~ a global computer network.

25. (Currently amended) The method of Claim 24, ~~the second network comprising a local area network, and~~ further comprising:

selectively outputting the request packet to the second computing device through ~~[[the]]~~ a local area network.

26. (Currently amended) The method of Claim 18, comprising:

~~in response to at least the initialization packet, establishing a data structure that represents a connection with the client; and~~

~~in response to at least the request packet and the state, selectively outputting a reference to the data structure~~ packet containing the information associated with the connection with the client to the second computing device for associating an application of the second computing device with the connection.

27. (Currently amended) The method of Claim 18, comprising:

~~in response to at least the initialization packet, establishing a data structure that represents a connection with the client, the data structure including~~ wherein the information associated with the connection with the client includes a group of sequence numbers associated with the connection.

28. (Currently amended) The method of Claim 27, further comprising:

~~in response to at least the request packet and the state, selectively outputting a reference to the data structure~~ a packet containing the information associated with the connection with the client to the second computing device for outputting a response packet to the client according to

the group of sequence numbers, such that the output response packet bypasses the first computing device.

29. (Original) The method of Claim 27 wherein the group of sequence numbers includes at least one start sequence number, at least one current sequence number, and at least one acknowledgement sequence number.

30. (Currently amended) The method of Claim 18, ~~further comprising:~~
~~in response to at least the initialization packet, establishing a data structure that represents~~
~~a wherein the packet containing the information associated with the connection with the client,~~
~~the data structure including~~ includes an address of the first computing device, an address of the
second computing device, an address of the client, and a flag indicating the type of packet.

31. (Currently amended) The method of Claim 30 wherein the ~~address includes~~
addresses include an IP address.

32. (Currently amended) The method of Claim 31 wherein the ~~address includes~~
addresses include a port.

33. (Original) The method of Claim 32 wherein the port is a TCP port.

34. (Original) The method of Claim 32 wherein the port is a UDP port.

35. (Currently amended) ~~[[An]]~~ A first intelligent network interface device,
comprising:

~~a first physical port for receiving an IP request packet from a client over a first network;~~
and

~~a second physical port for transmitting the received IP request packet over a second network that is logically separate from the first network; and~~

~~a processor that is structured to autonomously and without invoking services of a host operating system:~~

~~maintain a state information table; [[and]]~~

~~receive an initialization packet from a client;~~

~~create an unattached connection endpoint, wherein the unattached connection endpoint contains information associated with the client and the first intelligent network interface device;~~

~~transmit a response packet to the client;~~

~~receive an IP request packet from the client associated with the unattached connection endpoint; and~~

~~selectively transmit the received IP request packet to a second intelligent network interface device, based at least in part on the state information table;~~

~~transmit a packet containing the information associated with the client and the first intelligent network interface device contained within the unattached connection endpoint to a second intelligent network interface device;~~

~~delete the unattached connection endpoint in response to receiving an acknowledgement indicating that the second intelligent network interface device received the packet containing the unattached connection endpoint information; and~~

transmit the request packet to the second intelligent network interface device by adding an encapsulation header, so that the second intelligent network interface device causes a response IP packet that appears to have been sent from the first intelligent network interface device to be sent transparently to the client, ~~wherein selectively transmitted request packets transmitted by the processor are transmitted through the second port.~~

36. (Currently amended) The first intelligent network interface device of claim 35, further ~~comprising:~~ coupled to a synchronization ~~[[port]]~~ network for receiving synchronization information, wherein the processor ~~maintains~~ is configured to maintain the state information table based at least in part on the received synchronization information.

37-38. (Canceled)

39. (Currently amended) A server farm, comprising:
a plurality of servers, each server comprising a first computing device;
~~a first network to receive client requests and coupled to the first computing device of a first server of the plurality of servers;~~
~~a second network logically and physically separate from the first network, configured to redistribute received client requests and coupled to the first computing device of each of the plurality of servers; and~~
~~a third network logically and physically separate from the first and second networks, configured to transmit synchronization information and coupled to the first computing device of each of the plurality of servers;~~

wherein the first computing device of ~~[[the]]~~ a first server of the plurality of servers is configured to: ~~autonomously, and without invoking services of a host operating system;~~
~~selectively redistribute a client request received via the first network to a second server in the~~
~~plurality of servers based at least in part on synchronization information transmitted via the third~~
~~network, wherein redistributed client requests are redistributed through the second network~~

receive a SYN packet originating from a client;

store information associated with a connection with the client;

output a SYN/ACK packet to the client;

receive a PUSH packet originating from the client; and

selectively, based at least in part on synchronization information transmitted
between the plurality of servers;

output a migration packet containing the information associated with the
connection with the client to a first computing device of a second server;

receive an acknowledgement packet that indicates that the first computing
device of the second server received the packet containing the information associated with the
connection with the client; and

encapsulate and output the PUSH packet to the first computing device of
the second server.

40. (Previously presented) The server farm of claim 39, further comprising:
a first router, coupled to the first server and configured to transmit client requests to the
first server; and

a second router, coupled to the second server and configured to transmit a response to the client from the second server;

wherein the response to the client transmitted by the second server bypasses the first router.

41. (Currently amended) The server farm of claim 39 wherein ~~the first network is coupled to each of the plurality of servers and~~ each server can receive a client request.

42. (Currently amended) A computer-readable memory medium containing instructions for controlling a computer processor ~~[[in]]~~ associated with a server among a plurality of servers to selectively load balance and direct network requests among the plurality of servers ~~autonomously, without invoking services of a host operating system, by:~~

maintaining a state table associated with the plurality of servers; and

~~when a client request packet is received at a first physical port coupled to a first network, selectively generating, based at least in part on the maintained state table, a first type of network packet for transmission to a client through the first network or a second type of network packet for transmission to another processor residing in a different one of the plurality of servers at a second physical port coupled to a second network that is logically separate from the first network receiving an initialization packet originating from a client;~~

creating an unattached endpoint, and storing information that associates the unattached endpoint with the client and the server;

outputting an acknowledgement packet to the client;

receiving a request packet generated by the client; and

selectively, based at least in part on the state information table;

outputting a migration packet containing the information that associates the unattached endpoint with the client and the server to a second processor residing in a different one of the plurality of servers;

receiving a packet from the second processor that indicates that the second processor received the migration packet and successfully processed it;

generating a forward packet that encapsulates the request packet; and

outputting the forward packet to the second processor.

43. (Currently amended) The computer-readable memory medium of claim 42, further comprising instructions that control the processor by:

~~when a network packet of the second type~~ forward packet ~~is received at the second port coupled to the second network,~~ selectively generating a ~~third type of network packet~~ response packet for transmission to the client ~~through the first network.~~

44. (Currently amended) The computer-readable memory medium of claim 42, further comprising instructions that control the processor by:

~~when a network packet of the second type~~ forward packet ~~is received at the second port coupled to the second network,~~ selectively generating a ~~third type of network packet~~ response packet for transmission to the client ~~through a third network that is logically separate from the first network and the second network.~~

45. (Currently amended) The computer-readable memory medium of claim 42 wherein the ~~second type of network packet~~ forward packet contains an encapsulation header that identifies client connection information.

46. (Currently amended) A server for use in a computer system server farm, comprising:

means for monitoring a state of the server farm;

means for receiving packets from a global network;

means for generating, ~~without invoking services of a host operating system,~~ a first type of packet and transmitting the first type of packet via the global network when an initialization packet is received from the global network;

means for storing a data structure containing information associated with a connection with the client;

means for selectively generating, ~~without invoking services of a host operating system~~ and based at least in part on the monitored state of the server farm, a second type of packet when a client request packet is received from the global network; [[and]]

means for transmitting, ~~without invoking services of a host operating system,~~ the second type of packet to ~~another~~ a second server in the server farm, wherein the means for transmitting the second type of packet bypasses the means for receiving packets from the global network;

means for receiving a third type of packet from the second server;

means for generating a fourth type of packet that encapsulates the client request packet;

and

means for transmitting the fourth type of packet to the second server.

47. (Currently amended) The server of claim 46 wherein the means for receiving packets from a global network comprises a connection to a first local area network and the means for transmitting the second type of packet, the means for receiving a third type of packet, and the

means for transmitting the fourth type of packet ~~comprises~~ comprise a connection to a second local area network that is ~~logically~~ separate from the first local area network.

48. (Currently amended) The server of claim 47 wherein the means for monitoring the state of the server farm comprises a connection to a synchronization network that is ~~logically~~ separate from the first local area network.

49. (Currently amended) An information processing system, comprising:

a first computer system; and

a second computer system having a network interface card that is structured to:

receive an initialization packet originating from ~~created by~~ a client;

output a response packet to the client to set up a connection over a network;

store a data structure containing information that identifies the connection;

receive a request packet originating from the client directed to the connection;

[[and]]

based on at least a state of at least one of the first computer system and the second computing system, selectively;

output a packet containing the information that identifies the connection to a network interface card of the first computer system, thereby migrating the connection to the first computer system;

receive, from the first computer system, a packet that indicates that the first computer system received the packet containing the information identifying the connection; and

output a forwarded-request packet to [[a]] the network interface card of the first computer system ~~thereby migrating the connection to the first computer system,~~ the forwarded-

request packet encapsulating the request packet and including both ~~a reference to~~ information identifying the connection and a field in a header of the forwarded-request packet indicating that the forwarded-request packet is a forwarded packet.

50. (Currently amended) The information processing system of claim 49 wherein the first computer system is structured to ~~transparently~~ output a response packet to the client in response to the received request forwarded-request packet directed to the connection, such that the client perceives the response packet is received from the second computer system.

51. (Canceled)

52. (Currently amended) The information processing system of claim 49 wherein the network interface card of the second computer system selectively outputs the request forwarded-request packet to the network interface card of the first computer system without using TCP splicing techniques.

53. (Currently amended) The method of claim 30, ~~further comprising:~~
~~in response to at least the request packet and the state, selectively outputting a reference to the data structure to the second computing device for outputting a response packet to the client with a source address that indicates the~~ wherein the information associated with the connection with the client includes an address of the first computing device, an address of the second computing device, an address of the client, and a flag indicating the type of packet, such that the information associated with the connection with the client can be used to create an output response packet that bypasses the first computing device.

54-56. (Canceled)

57. (Currently amended) A method of servicing client requests, comprising:

- receiving a client request packet ~~through a first network~~;
- selectively redistributing the received client request packet ~~through a second network that is logically and physically separate from the first network~~;
- transmitting synchronization information ~~through a third network that bypasses the first network and the second network~~; and
- selectively migrating a client connection based at least in part on the transmitted synchronization information;

wherein the ~~method is performed~~ received client request packet is selectively redistributed and the client connection is selectively migrated by: autonomously and without invoking services of a host operating system

- storing information associated with a connection with the client;
- outputting a packet containing a copy of the information associated with the connection with the client;
- receiving an acknowledgement that indicates that the packet containing a copy of the information associated with the connection with the client was received;
- encapsulating the client packet; and
- transmitting the encapsulated client packet.

58. (Previously presented) The method of claim 57, further comprising:

- maintaining a state information table based at least in part on the transmitted synchronization information.

59. (Previously presented) The method of claim 57 wherein the selectively redistributing is based at least in part on the transmitted synchronization information.

60. (Currently amended) The method of claim 57 ~~wherein the client packet is a request packet~~, further comprising performing an operation in response to the request packet.

61. (Previously presented) The method of Claim 60 wherein the operation is part of a socket-based software application.

62. (Currently amended) The method of Claim 57 wherein the client request packet is received through a first network ~~comprises~~ comprising a global computer network.

63. (Currently amended) The method of Claim 62 wherein the received client request packet is redistributed through a second network ~~comprises~~ comprising a local area network.

64-65. (Canceled)

66. (Currently amended) The method of Claim ~~[[65]]~~ 57 wherein the data structure includes a group of sequence numbers associated with the connection.

67. (Previously presented) The method of Claim 66, further comprising:
outputting a response packet to the client according to the group of sequence numbers.